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Comparison of Apical Extrusion of Debris by Using different types of rotary Systems

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Introduction

Apical extrusion of debris during root canal instrumentations may lead in increased inflammation, flare-ups and delayed healing. Therefore , instrumentation techniques that cause the least extrusion of debris are desirable .This study aimed to compare the amount of apically extruded debris associated with different single-file NiTi rotary instruments (Reciproc, WaveOne, OneShape, F360 and Neolix) versus rotary multiple-file ProTaper Universal Ex vivo.

Materials and Methods

One hundred twenty human mandibular premolars with similar root length,apical diameter and canal curvature were selected and randomly assigned to 6 groups. The root canals were instrumented regarding the manufacturer's instructions using the rotary single-file systems of Reciproc, WaveOne, OneShape, F360 and Neoniti or rotary multiple-file ProTaper instruments. The apically extruded debris was collected in pre-weighed vials and following drying in an incubator, they were quantified using a balance with 0.00001 gr exact. The debris volumewas statistically analyzed using ANOVA test in 6 groups while the paired comparisons were done by Games-Howell test.

Results

Table 1 shows the mean mass and standard deviation of the apical debris produced by each rotary system. The ProTaper Universal produced the highest amount of debris, and the F360 produced the least amount of debris. There was a significant difference between the ProTaper Universal and the F360 (P=0.02). Pairwise comparisons of the other systems showed no significant differences (P>0.05). Canal preparation took significantly longer with the ProTaper Universal than with the F360 (P=0.0001). In addition, the total preparation time was significantly longer with the Neoniti A1 than with the Reciproc R25 (P=0.008), OneShape (P=0.006) and F360 (P≤0.0001). Furthermore, the total preparation time with the WaveOne Primary was significantly longer than with the F360 (P=0.03). Table 1 shows the mean preparation time for each rotary system.

Conclusion:

In this study, the F360 single-file rotary system extruded less debris than did the multi-file Pro Taper Universal, although all the tested instrumentation systems did extrude debris apically.

Table 1: Amount of apically extruded debris (milligrams) and preparation time (seconds) by each rotary system (n=20)

Type of Instrument		Reciproc	WaveOne	OneShape	F360	Neoniti A1	ProTaper Universal
Debris	Mean	.97614	1.10983	1.29466	.79700*	1.70233	2.07117*
Extrusion	SD	.47768	.67648	.83966	.53143	1.30607	1.38012
Preparation	Mean	42.85 ^{a,b}	54.85 ^{a,c,d}	39.68 ^{a,b}	32.74 ^{b}	61.65 ^{c}	88.60 ^{d}
time	SD	10.94	25.97	20.42	2.88	4.19	10.73

SD: Standard deviation
*Indicates a significant difference in the amount of extruded debris in milligrams (P<0.05)
Different superscripted letters indicate a significant difference between groups in preparation times (P<0.05)

References:

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